

STRUCTURE ANALYSIS AND DEFECT DETECTION SYSTEM

Abstract

A structure analysis and defect detection system in which a laser light source provides light via optical fiber to fiber Bragg gratings that change resonant frequency as stresses change in the structure. Light at the resonant frequencies of the fiber Bragg gratings is reflected and light of other frequencies is passed. The respective reflected light is directed through a Fabry–Perot interference filter or a fiber interferometer and detected by a photodetector. If the Fabry–Perot interference filter is used, the intensity of the reflected light indicates current stress at a fiber Bragg grating. If the fiber interferometer is used, a beat frequency due to heterodyne interference in the light indicates current stress at the respective fiber Bragg grating. Comparison data for the respective characteristic in the detected light over time permits stress analysis, and comparison of such data with pre-determined limit values permits defect or failure detection.